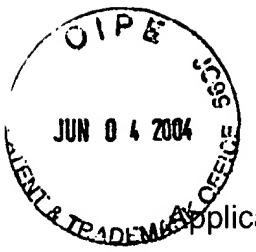
AF/1746$
IFW



Rev 01/30/04

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Francisco A. Uribe	Docket No.:	S-94,613
Serial No.:	09/848,823	Examiner:	J. Crepeau
Filed :	5/3/2001	Art Unit:	1746
For :	FUEL CELL ANODE CONFIGURATION FOR CARBON MONOXIDE TOLERANCE		

Mail Stop Appeal Brief - Patents
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL OF APPEAL BRIEF

1. Transmitted herewith in triplicate is the Appeal Brief in this application with respect to the Notice of Appeal filed on May 18, 2004.

2. ☒ Applicant claims small entity status.

3. Attached is a Fee Transmittal Form.

Respectfully submitted,

Date: June 02, 2004

Signature of Attorney

Reg. No. 28,351
Phone (505) 665-3112

Ray G. Wilson
LC/IP, MS A187
Los Alamos, New Mexico 87545

CERTIFICATE OF MAILING/TRANSMISSION (37 CFR 1.8(a))

I hereby certify that this correspondence is, on the date shown below, being:

MAILING

☒ deposited with the United States Postal Service on the date shown below with sufficient postage as first class mail in an envelope addressed to the: Commissioner for Patents, PO Box 1450, Alexandria, VA 22313-1450.

Date: June 02, 2004

FACSIMILE

☐ transmitted by facsimile to the United States Patent and Trademark Office

Signature

Ray G. Wilson
(type or print name of person certifying)

Rev. 03/05/04

FEE TRANSMITTAL
For FY 2004

Patent fees are subject to annual revision

☒ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT: $165.00

Complete if Known	
Application Number:	09/848,823
Filing Date:	5/3/2001
First Named Inventor:	Francisco A. Uribe
Examiner Name:	J. Crepeau
Group/Art Unit:	1746
Attorney Docket No.:	S-94,613

METHOD OF PAYMENT (check all that apply)

1. ☒ The commissioner is hereby authorized to charge indicated fees and credit any over payments to:
   Deposit Account Number: **12-2150**
   Deposit Account Name: **Los Alamos National Laboratory**
   ☒ Charge Any Additional Fee Required Under 37 C.F.R. 1.16 and 1.17

FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee		Small Entity Fee		Fee Description	Fee Paid
1001	$770	2001	$385	Utility filing fee	
1004	$770	2004	$385	Reissue filing fee	
1005	$160	2005	$80	Provisional filing fee	

SUBTOTAL (1) $000.00

2. EXTRA CLAIM FEES

		Extra Claims	Fee from Fee Paid Below
Total Claims	–20** =	X	=
Independent Claims	–3 ** =	X	=
Multiple Dependent			=

** *or number previously paid, if greater; For Reissues, see below*

Large Entity Fee		Small Entity Fee		Fee Description
1202	$18	2202	$9	Claims in excess of 20
1201	$86	2201	$43	Independent claims in excess of 3
1203	$290	2203	$145	Multiple dependent claim, if not paid.
1204	$86	2204	$43	** Reissue independent claims over original patent
1205	$18	2205	$9	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) $

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1051	**$130**	2051	**$65**	Surcharge – late filing fee or oath	
1052	**$50**	2052	**$25**	Surcharge – late provisional filing fee or cover sheet	
1812	**$2,520**	1812	**$2,520**	For filing a request for reexamination	
1251	**$110**	2251	**$55**	Extension for reply within first month	
1252	**$420**	2252	**$210**	Extension for reply within second month	
1253	**$950**	2253	**$475**	Extension for reply within third month	
1254	**$1,480**	2254	**$740**	Extension for reply within fourth month	
1255	**$2,010**	2255	**$1,005**	Extension for reply within fifth month	
1401	**$330**	2401	**$165**	Notice of Appeal	**$165.00**
1402	**$330**	2402	**$165**	Filing a brief in support of an appeal	
1403	**$290**	2403	**$145**	Request for oral hearing	
1452	**$110**	2452	**$55**	Petition to revive – unavoidable	
1814	**$110**	2814	**$55**	Terminal Disclaimer	
1453	**$1,330**	2453	**$665**	Petition to revive – unintentional	
1460	**$130**	1460	**$130**	Petitions to the Commissioner	
1806	**$180**	1806	**$180**	Submission of Information Disclosure Statement	
1809	**$770**	2809	**$385**	Filing a submission after final rejection (37 CFR 1.129 (a))	
1810	**$770**	2810	**$385**	For each additional invention to be examined (37 CFR 1.129(b))	
1811	**$100**	1811	**$100**	Certificate of Correction	
1504	**$300**	1504	**$300**	Publication fee for early, voluntary, or normal publication	
1801	**$770**	2801	**$385**	Request for Continued Examination (RCE)	

Other fee (specify) _____

SUBTOTAL (3) $

Reduced by Basic Filing Fee Paid

SUBTOTAL FROM 1 $
SUBTOTAL FROM 2 $
SUBTOTAL FROM 3 $165.00

TOTAL AMOUNT OF PAYMENT $165.00

SUBMITTED BY			Complete (if applicable)	
Printed Name:	Ray G. Wilson		Reg. No.	28,351
Signature:	Ray G. Wilson	Date: 06/02/04	Telephone	(505) 665-3112

01/30/04

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Appelants:	Francisco A. Uribe et al.	Docket No.:	S-94,613
Serial No.:	09/848,823	Examiner:	J. Crepeau
Filed :	May 3, 2001	Art Unit:	1746

For : FUEL CELL ANODE CONFIGURATION FOR CARBON MONOXIDE TOLERANCE

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

TABLE OF CONTENTS

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Appelants:	Francisco A. Uribe et al.	Docket No.:	S-94,613
Serial No.:	09/848,823	Examiner:	J. Crepeau
Filed :	May 3, 2001	Art Unit:	1746
For :	FUEL CELL ANODE CONFIGURATION FOR CARBON MONOXIDE TOLERANCE		

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

STATEMENT OF THE REAL PARTY IN INTEREST

The Regents of the University of California is the assignee of all right, title, and interest in U.S. Patent Application Serial No. 09/848,823 from the Government of the United States, United States Department of Energy.

RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences related this case.

STATUS OF ALL CLAIMS

This is an appeal from the final rejection (Examiner's Action dated March 8, 2004) of Claims 1-4 currently pending in the subject patent application. Original Claim 5 has been cancelled. No claims have been allowed. Claims 1-4 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Uchida et al. (Japanese patent publication JP-203537) in view of Eguchi et al. (Removal of CO from Methanol Reforming Gas by

Low Temperature Shift Reaction, Science and Technology in Catalysis 1998 (Kodansha Ltd. 1999)).

The rejection of Claims 1-4 is appealed.

STATUS OF AMENDMENTS

No amendments have been filed subsequent to the final rejection.

SUMMARY OF THE INVENTION

The fuel stream for hydrogen fuel cells is hydrogen gas, which may contain other gases resulting from the hydrogen generation process. (Page 1, lines 16-20). In particular, carbon monoxide (CO) may be present and act to poison an anode catalyst used to catalyze the electrochemical reactions occurring on a polymer membrane of the fuel cell. (Page 1, lines 22-24).

It is known to place a conventional catalyst containing a precious metal on an anode backing spaced from the membrane to oxidize the CO to CO_2, which is not detrimental to fuel cell performance, before the fuel stream reaches the membrane catalyst. (Page 2, lines 25-31; Page 3, lines 1-7). In accordance with the present invention, the precious metal catalyst is replaced with a non-precious metal oxidation catalyst selected from the group consisting of Cu, Fe, Co, Tb, W, Mo, Sn, and oxides thereof. (Page 6, lines 15-22; Page 11, lines 9-15; Figure 6).

ISSUE PRESENTED FOR REVIEW

Whether Claims 1-4 were properly rejected under 35 U.S.C. §103(a) as being unpatentable over Uchida et al. (JP 8-203537) in view of Eguchi et al. (*Sci. and tech. in Catalysis*, 1998).

GROUPING OF THE CLAIMS

Appelants do not believe that any special grouping of the claims leads to a better understanding of the issues.

ARGUMENT

Claim 1 recites "an anode backing . . . having . . . a second surface" with an oxidation catalyst that "consists essentially of a single non-precious metal oxidation catalyst selected from the group consisting of Cu . . ., and oxides thereof." As applied by the Examiner, Uchida et al. teach the limitations of Claim 1, except that a precious metal catalyst (Pt-Ru) is used on the anode, not the non-precious metal catalysts recited in appellants' Claim 1. The Examiner then cites Eguchi et al. as teaching "a copper catalyst supported on a mixed oxide" to oxidize CO in a hydrogen fuel stream for a fuel cell and concluding that an "artisan would be motivated by the disclosure of Eguchi et al. to use a catalyst consisting of copper in the CO oxidation catalyst layer of Uchida et al."

Appellants first traverse the statement that Eguchi et al. disclose "a catalyst consisting of copper."

> To imbue one of ordinary skill in the art with knowledge of the invention in suit, when no prior art reference or references of record convey or suggest that knowledge, is to fall victim to the insidious effect of a hindsight syndrome wherein that which on the inventor taught is used against its teacher.
> **W.L. Gore & Assocs., Inc. v. Garlock, Inc.**, 220 USPQ 303, 312-13 (Fed. Cir. 1983), **cert. denied**, 469 U.S. 851 (1984).

Eguchi et al. teach "copper catalysts support on mixed oxides" (Abstract, Page 445). The catalyst taught by Eguchi et al. does not consist "essentially of" Cu", but Cu supported on a mixed oxide ((Experimental, line 1, Page 445; Figure 2, Page 446; Table 1, Page 448; Conclusion, last sentence, Page 445). The only teaching of Cu in the references of record as an effective catalyst on a fuel cell anode is appellants' specification and claims.

As noted by the Manual of Patent Examining Procedure (MPEP) 2143.01, "Obviousness can be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art." Yet another requirement is that the references would teach how to make the modification suggested by the Examiner.

> In determining the propriety of the Patent Office case for obviousness in the first instance, it is necessary to ascertain whether or not the reference teachings would appear to be sufficient for one of ordinary skill in the relevant art having the references before him to make the proposed substitution, combination or other modification.
> **In re Lintner**, 175 USPQ 560, 562 (C.C.P.A. 1972)

Appellants traverse the conclusion that the Eguchi et al. teaching would motivate an artisan to use a catalyst consisting of copper as the CO oxidation catalyst of Uchida et al. First, there is nothing in Eguchi et al. to suggest placing the copper/mixed oxide catalyst within a fuel cell structure, such as the anode structure taught by Uchida et al. and appellants; rather, Eguchi et al. imply use of the catalyst only in a bulk fuel stream: "In this study, CO removal was carried out over Cu catalysts supported on mixed oxides by WGSR and selective CO oxidation . . . in the presence of a large amount of H_2O and O_2." (Introduction, last sentence, Page 445).

Further, there is no teaching in Eguchi et al. how to adapt the catalyst of Cu on a mixed oxide support to form an effective catalyst for selective CO oxidation on a PEM fuel cell anode structure. For example, in the Abstract, last sentence, Page 445, Eguchi et al. teach that:

> This indicates that the design of an active shift/oxidation catalyst operative at 100-150°C is a possible method for selective removal of CO in the methanol reforming gas."

Likewise, Table 1 and Figure 5 show conversion percentages only at temperatures of 150°C and above, with conversion percentages decreasing as the temperature drops below 150°C.

In contrast, the membrane of a PEM fuel cell would dry at temperatures above the boiling point of water, i.e., at temperatures equal to or greater than 100°C, and cease to

function as an effective electrolyte. Any catalyst operating within the fuel cell adjacent the membrane as taught by Uchida et al. and appellants must necessarily operate at temperatures less than 100°C. Appellants' teach at page 10, lines 22-23:

> Notice that all the catalysts containing Cu are very active for CO oxidation at a cell operating temperature (80°C) with air bleed as low as 4%.

See also Uchida et al., paragraph [0017], that teaches supplying a fuel gas that had been heated to 60°C.

Thus, a person of ordinary skill in the art having Uchida et al. and Eguchi et al. before them would not be motivated to substitute Cu on a mixed oxide support or Cu as a catalyst on the fuel cell anode for the precious metal catalyst taught by Uchida et al. Further, the teachings of Uchida et al. and Eguchi et al. do not provide sufficient teachings to instruct an artisan how to incorporate the copper/mixed oxide catalyst of Eguchi et al. into the fuel cell structure of Uchida et al.

CONCLUSION

Appellants respectfully assert that Eguchi et al. do not fairly teach a CO oxidation catalyst that "consists essentially of a single non-precious metal catalyst selected from the group consisting of CU . . . and oxides thereof." Appellants further assert that the references do not provide the necessary motivation or sufficiency of teaching to make the changes to Uchida et al. to make obvious appellants' claimed invention. The rejection of Claims 1-4 should not be sustained.

Respectfully submitted,

Date: June 1, 2004

Signature of Attorney

Reg. No. 28,351
Phone (505) 665-3112

Ray G. Wilson
Los Alamos National Laboratory
LC/IP, MS A187
Los Alamos, New Mexico 87545

APPENDIX A - CLAIMS ON APPEAL

1. A PEM fuel cell usable in a reformate fuel stream containing diluted hydrogen fuel with CO as an impurity and with added air, comprising:

a polymer electrolyte membrane having an electrocatalytic surface formed from an electrocatalyst mixed with the polymer and bonded on an anode side of the membrane; and

an anode backing formed of a porous electrically conductive material and having a first surface abutting the electrocatalytic surface and a second surface facing away from the membrane, where the second surface has an oxidation catalyst layer effective to catalyze the oxidation of CO by oxygen present in the fuel stream where at least the layer of oxidation catalyst consists essentially of a single non-precious metal oxidation catalyst selected from the group consisting of Cu, Fe, Co, Tb, W, Mo, Sn, and oxides thereof.

2. A PEM fuel cell system according to Claim 1, where the electrocatalyst is selected from the group consisting of Pt and Pt/Ru alloy.

3. A PEM fuel cell system according to Claim 1, wherein the electrocatalyst is Pt.

4. A PEM fuel cell system according to Claim 1, wherein the layer of oxidation catalyst further includes a hydrophobic material.